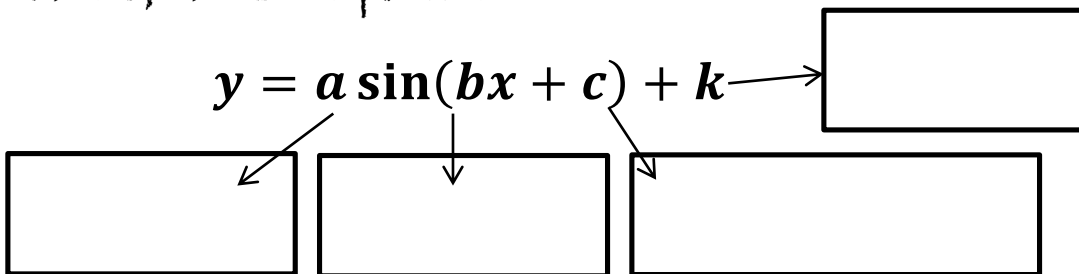


**Objective:** To graph trigonometric functions with horizontal (phase) shifts.

**Vocabulary:**

**Phase Shift:** the amount a wave has shifted horizontally from the original wave.

**Transformed Equation**



Identify each of the key features for the following examples. Then, graph the function.

**Example 1:**  $h(x) = \sin(x - 2\pi) - 1$

Vertical Shift: \_\_\_\_\_

Amplitude: \_\_\_\_\_

Phase Shift: \_\_\_\_\_

Period: \_\_\_\_\_

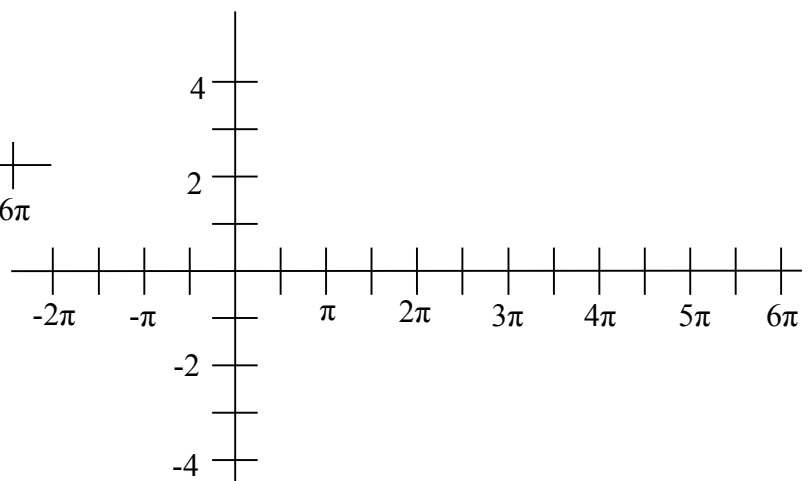
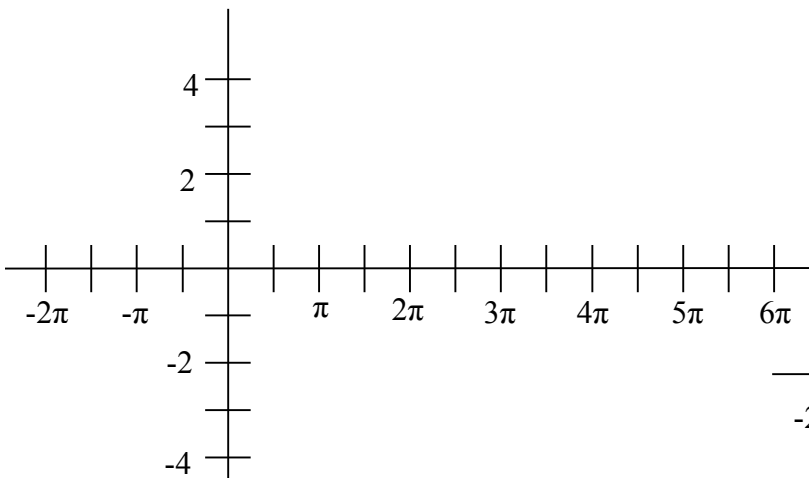
**Example 2:**  $m(x) = \cos(2x - 6\pi) + 3$

Vertical Shift: \_\_\_\_\_

Amplitude: \_\_\_\_\_

Phase Shift: \_\_\_\_\_

Period: \_\_\_\_\_



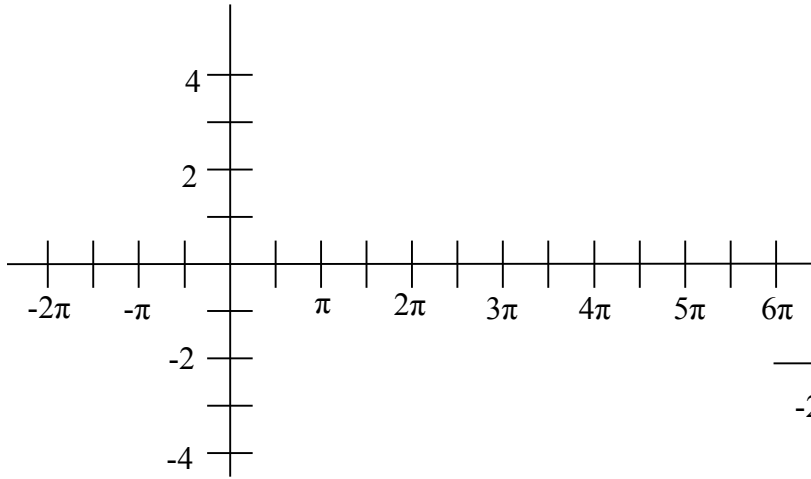
**Example 3:**  $t(x) = -2 \cos(2x + \pi) - 2$

Vertical Shift: \_\_\_\_\_

Amplitude: \_\_\_\_\_

Phase Shift: \_\_\_\_\_

Period: \_\_\_\_\_



**Example 4:**  $w(x) = 3 \sin \frac{1}{2}(x - \pi) + 1$

Vertical Shift: \_\_\_\_\_

Amplitude: \_\_\_\_\_

Phase Shift: \_\_\_\_\_

Period: \_\_\_\_\_

